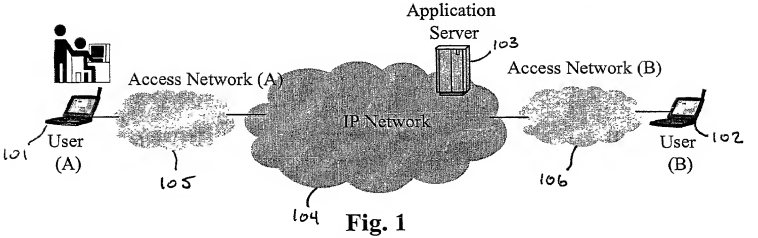

Fig. 1
PRIOR ART

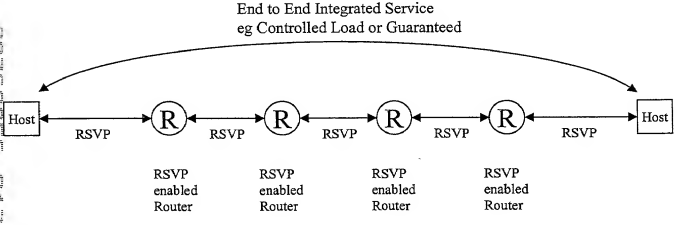

Fig. 2
PRIOR ART

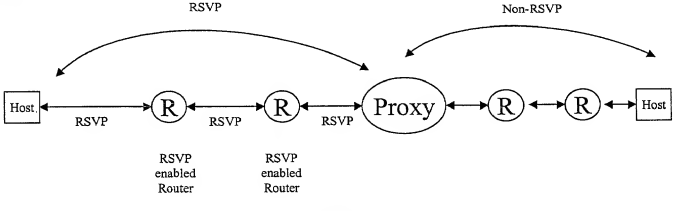

Fig. 3
PRIOR ART

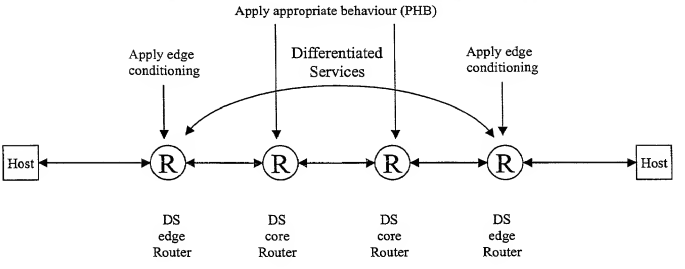

Fig. 4
PRIOR ART

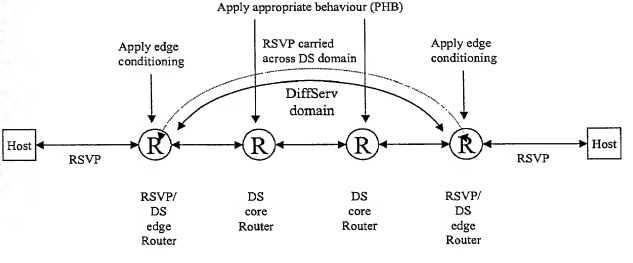

Fig. 5
PRIOR ART

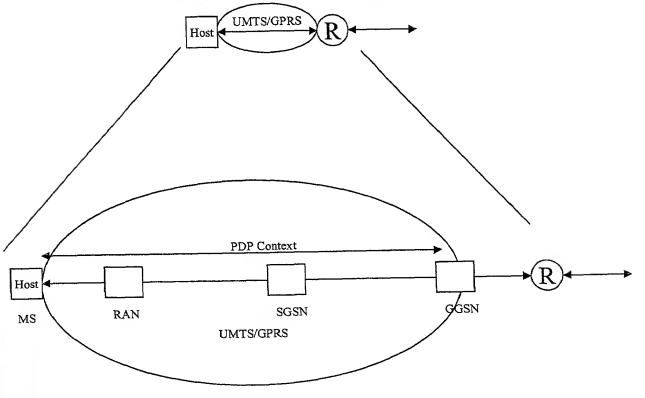

Fig. 6
PRIOR ART

Attorney Docket: 5268-460

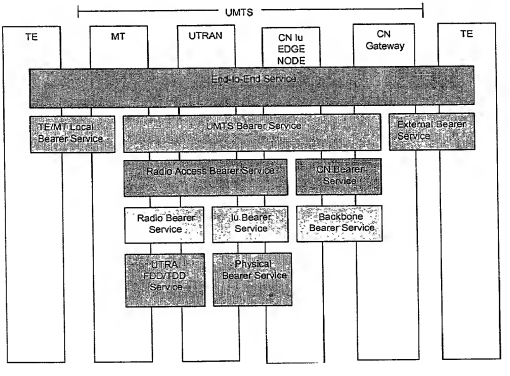

Fig. 7
PRIOR ART

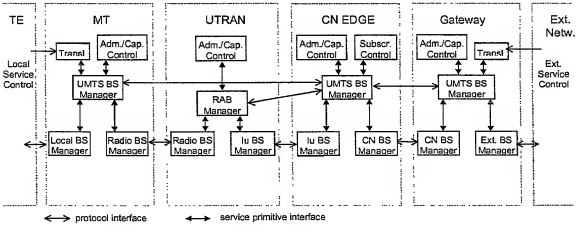

Fig. 8
PRIOR ART

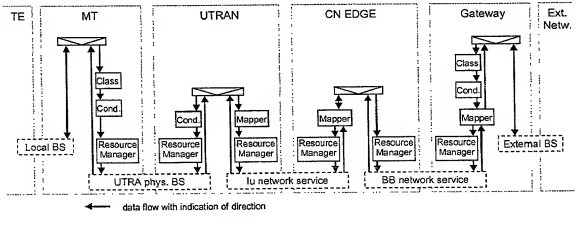

Fig. 9
PRIOR ART

Traffic class	**Conversational class** conversational RT	**Streaming class** streaming RT	**Interactive class** Interactive best effort	**Background** Background best effort
Fundamental characteristics	• Preserve time relation (variation) between information entities of the stream • Conversational pattern (stringent and low delay)	• Preserve time relation (variation) between information entities of the stream	• Request response pattern • Preserve payload content	• Destination is not expecting the data within a certain time • Preserve payload content
Example of the application	- voice	- streaming video	- Web browsing	- background download of emails

Fig. 10
PRIOR ART

Traffic class	Conversational	Streaming	Interactive	Background
Maximum bit rate	X	X	X	X
Guaranteed bit rate	X	X		
Delivery order	X	X	X	X
Maximum SDU size	X	X	X	X
SDU format info *)	X	X		
SDU loss ratio	X	X	X	X
Residual bit error ratio	X	X	X	X
Delivery of erroneous SDUs	X	X	X	X
Transfer delay	X	X		
Traffic handling prio			X	
Allocation/ Retention priority	X	X	X	X
Source statistics descriptor *)	X	X		

*) Parameter differs depending on if it is a UMTS BS description or a RAB service description

Fig. 11
PRIOR ART

Traffic class	The traffic class label contains a lot of information itself
Maximum bit rate	Used for downlink code reservation, policing and shaping towards external networks
Guaranteed bit rate	Used for admission control and resource reservation
Delivery order	Used to settle whether PDUs have to be buffered and re-ordered in order to be in sequence at the output of the system
Maximum SDU size	Used for admission control and policing
SDU format info *)	RLC configuration. If information of all possible SDU sizes is given, then RLC can be transparent (in case no ARQ is needed).
SDU loss ratio	Used for ARQ configuration, Error detection configuration on L1 (CRC)
Residual bit error ratio	Choice of channel coding, error detection on L1
Delivery of erroneous SDUs	Is the NW allowed to discard packets in case of erroneous checksum?
Transfer delay	The delay is used to determine whether ARQ shall/can be used or not. Also used for transport format settings.
Traffic handling priority	For differentiate interactive service class for scheduling purposes
Allocation/ Retention priority	Used for admission control and settlement in case of congestion, i.e. who to admit and who to discard.
Source statistics descriptor *)	This information that gives the possibility to use statistics at admission control, e.g. speech and DTX.

*) Parameter differs depending on if it is a UMTS BS description or a RAB service description

Fig. 12
PRIOR ART

Packet filter attribute	Valid combination types		
	I	II	III
Source Address and Subnet Mask	X	X	X
Protocol Number (IPv4) / Next Header (IPv6)	X	X	
Destination Port Range	X		
Source Port Range	X		
IPSec Security Parameter Index		X	
TOS (Ipv4) / Traffic Class (IPv6) and Mask	X	X	X
Flow Label (IPv6)			X

Fig. 14
PRIOR ART

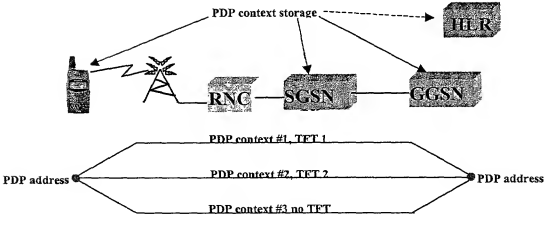

Fig. 13
PRIOR ART

Applied Semantics Exhibit 2025

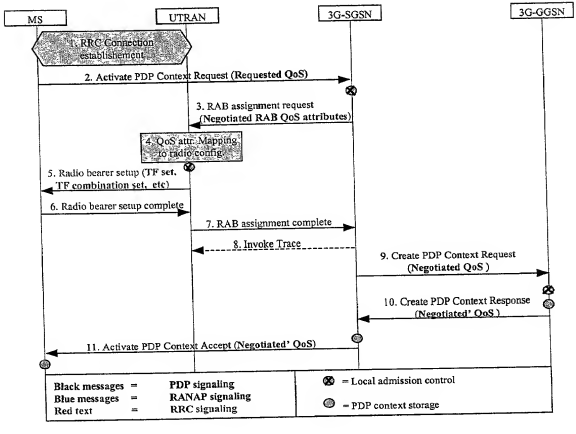

Fig. 15
PRIOR ART

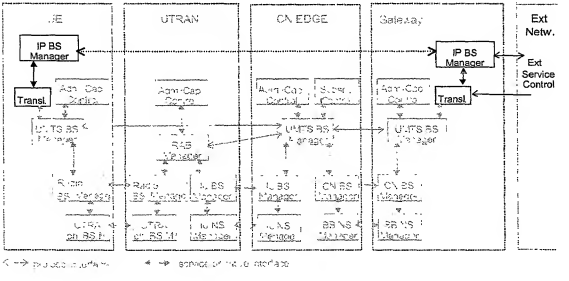

Fig. 16
PRIOR ART

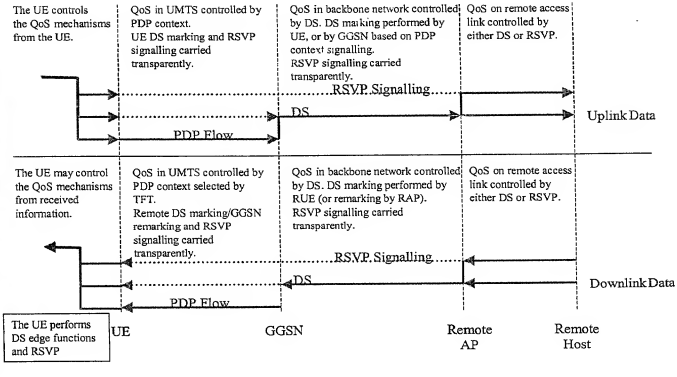
The UE controls the QoS mechanisms from the UE.
QoS in UMTS controlled by PDP context.
UE DS marking and RSVP signalling carried transparently.
QoS in backbone network controlled by DS. DS marking performed by UE, or by GGSN based on PDP context signalling.
RSVP signalling carried transparently.
QoS on remote access link controlled by either DS or RSVP.
RSVP Signalling
DS
Uplink Data
PDP Flow
The UE may control the QoS mechanisms from received information.
QoS in UMTS controlled by PDP context selected by TFT.
Remote DS marking/GGSN remarking and RSVP signalling carried transparently.
QoS in backbone network controlled by DS. DS marking performed by RUE (or remarking by RAP).
RSVP signalling carried transparently.
QoS on remote access link controlled by either DS or RSVP.
RSVP Signalling
DS
Downlink Data
PDP Flow
The UE performs DS edge functions and RSVP
UE
GGSN
Remote AP
Remote Host

Fig. 17

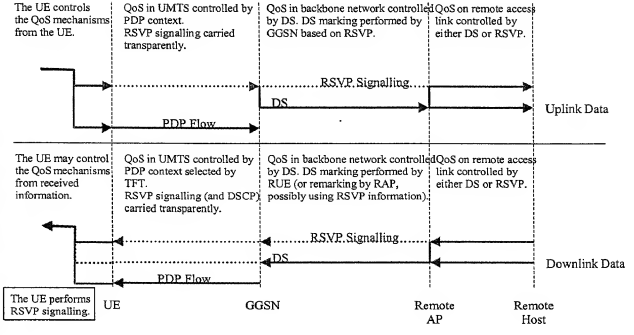
The UE controls the QoS mechanisms from the UE.
QoS in UMTS controlled by PDP context. RSVP signalling carried transparently.
QoS in backbone network controlled by DS. DS marking performed by GGSN based on RSVP.
QoS on remote access link controlled by either DS or RSVP.
RSVP Signalling
DS
Uplink Data
PDP Flow
The UE may control the QoS mechanisms from received information.
QoS in UMTS controlled by PDP context selected by TFT. RSVP signalling (and DSCP) carried transparently.
QoS in backbone network controlled by DS. DS marking performed by RUE (or remarking by RAP, possibly using RSVP information).
QoS on remote access link controlled by either DS or RSVP.
RSVP Signalling
DS
Downlink Data
PDP Flow
The UE performs RSVP signalling.
UE
GGSN
Remote AP
Remote Host

Fig. 18

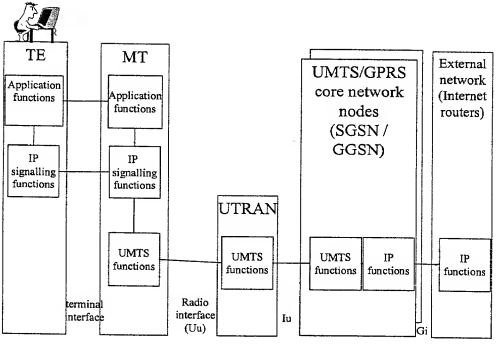
TE
MT
UMTS/GPRS core network nodes (SGSN / GGSN)
External network (Internet routers)
Application functions
Application functions
IP signalling functions
IP signalling functions
UTRAN
UMTS functions
UMTS functions
UMTS functions
IP functions
IP functions
terminal interface
Radio interface (Uu)
Iu
Gi

Fig. 19

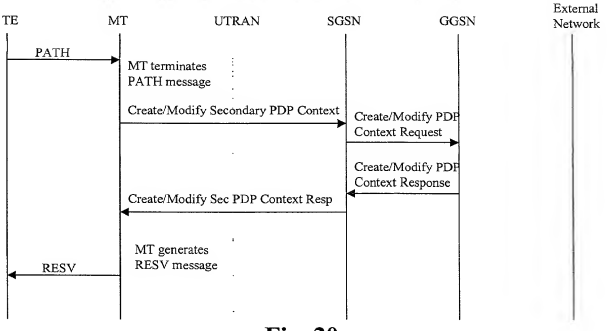
TE
MT
UTRAN
SGSN
GGSN
External Network
PATH
MT terminates PATH message
Create/Modify Secondary PDP Context
Create/Modify PDP Context Request
Create/Modify PDP Context Response
Create/Modify Sec PDP Context Resp
MT generates RESV message
RESV

Fig. 20

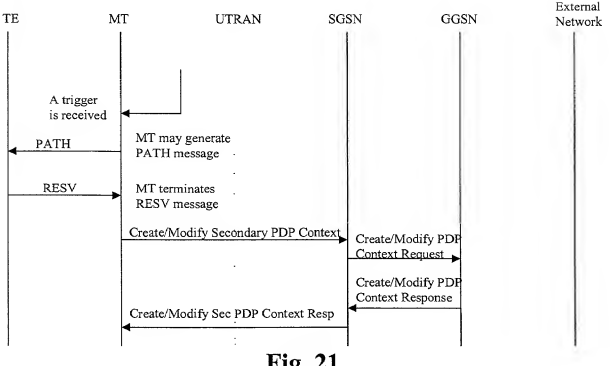
TE
MT
UTRAN
SGSN
GGSN
External Network
A trigger is received
PATH
MT may generate PATH message
RESV
MT terminates RESV message
Create/Modify Secondary PDP Context
Create/Modify PDP Context Request
Create/Modify PDP Context Response
Create/Modify Sec PDP Context Resp

Fig. 21

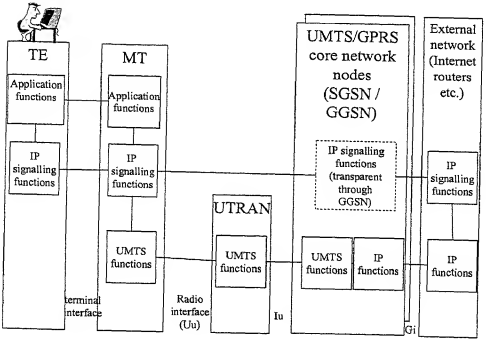
TE
MT
UMTS/GPRS core network nodes (SGSN / GGSN)
External network (Internet routers etc.)
Application functions
Application functions
IP signalling functions
IP signalling functions
IP signalling functions (transparent through GGSN)
IP signalling functions
UTRAN
UMTS functions
UMTS functions
UMTS functions
IP functions
IP functions
terminal interface
Radio interface (Uu)
Iu
Gi

Fig. 22

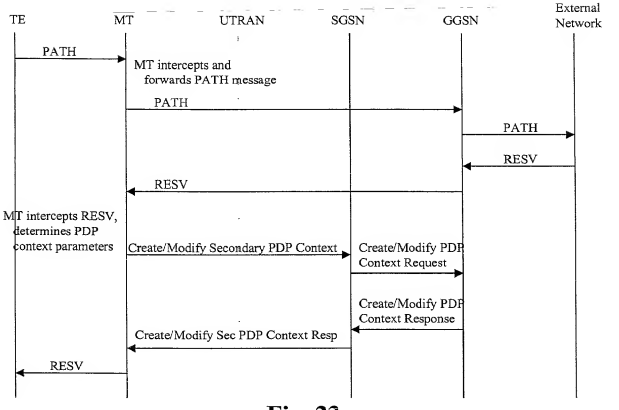
TE
MT
UTRAN
SGSN
GGSN
External Network
PATH
MT intercepts and forwards PATH message
PATH
PATH
RESV
RESV
MT intercepts RESV, determines PDP context parameters
Create/Modify Secondary PDP Context
Create/Modify PDP Context Request
Create/Modify PDP Context Response
Create/Modify Sec PDP Context Resp
RESV

Fig. 23

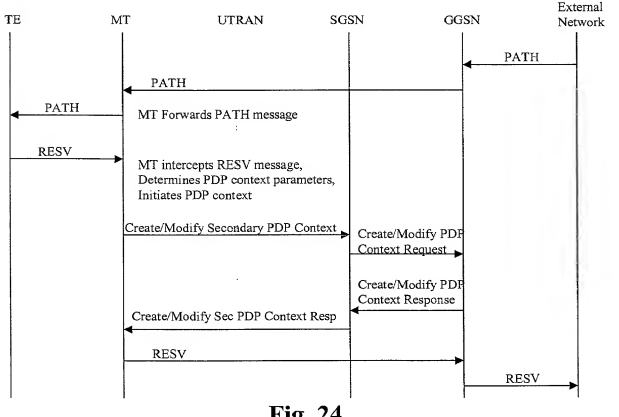
TE
MT
UTRAN
SGSN
GGSN
External Network
PATH
PATH
PATH
MT Forwards PATH message
RESV
MT intercepts RESV message, Determines PDP context parameters, Initiates PDP context
Create/Modify Secondary PDP Context
Create/Modify PDP Context Request
Create/Modify PDP Context Response
Create/Modify Sec PDP Context Resp
RESV
RESV

Fig. 24

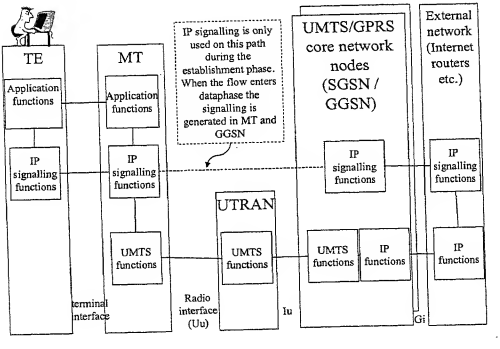
TE
MT
IP signalling is only used on this path during the establishment phase. When the flow enters dataphase the signalling is generated in MT and GGSN
UMTS/GPRS core network nodes (SGSN / GGSN)
External network (Internet routers etc.)
Application functions
Application functions
IP signalling functions
IP signalling functions
IP signalling functions
IP signalling functions
UTRAN
UMTS functions
UMTS functions
UMTS functions
IP functions
IP functions
terminal interface
Radio interface (Uu)
Iu
Gi

Fig. 25

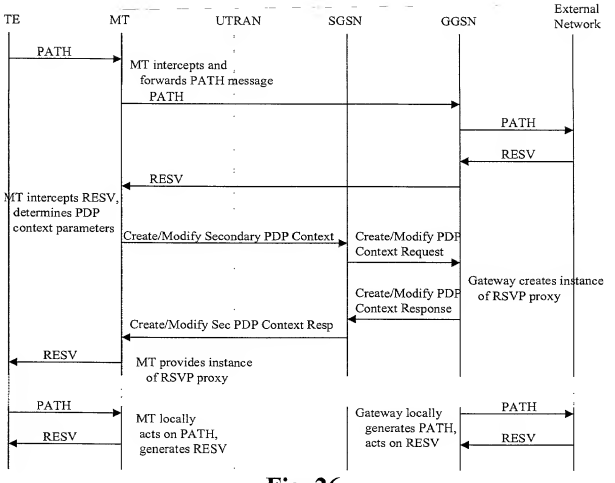
TE
MT
UTRAN
SGSN
GGSN
External Network
PATH
MT intercepts and forwards PATH message
PATH
PATH
RESV
RESV
MT intercepts RESV, determines PDP context parameters
Create/Modify Secondary PDP Context
Create/Modify PDP Context Request
Gateway creates instance of RSVP proxy
Create/Modify PDP Context Response
Create/Modify Sec PDP Context Resp
RESV
MT provides instance of RSVP proxy
PATH
MT locally acts on PATH, generates RESV
Gateway locally generates PATH, acts on RESV
PATH
RESV
RESV

Fig. 26

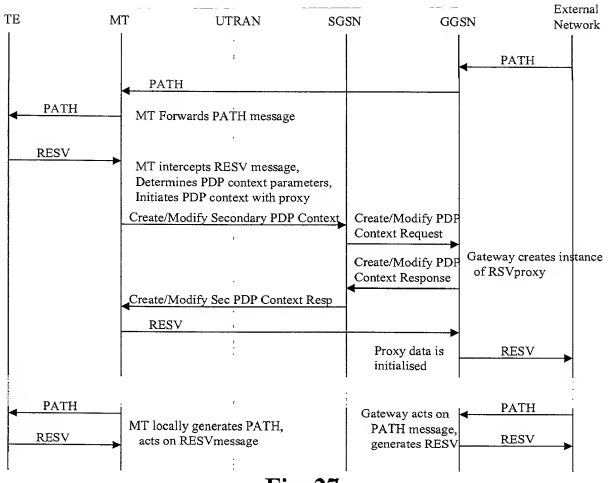
TE
MT
UTRAN
SGSN
GGSN
External Network
PATH
PATH
PATH
MT Forwards PATH message
RESV
MT intercepts RESV message, Determines PDP context parameters, Initiates PDP context with proxy
Create/Modify Secondary PDP Context
Create/Modify PDP Context Request
Create/Modify PDP Context Response
Gateway creates instance of RSVproxy
Create/Modify Sec PDP Context Resp
RESV
Proxy data is initialised
RESV
PATH
RESV
MT locally generates PATH, acts on RESVmessage
Gateway acts on PATH message, generates RESV
PATH
RESV

Fig. 27

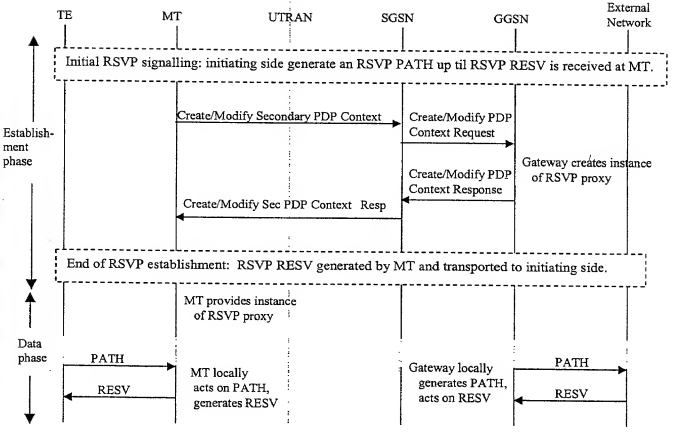
TE
MT
UTRAN
SGSN
GGSN
External Network
Initial RSVP signalling: initiating side generate an RSVP PATH up til RSVP RESV is received at MT.
Establish-ment phase
Create/Modify Secondary PDP Context
Create/Modify PDP Context Request
Gateway creates instance of RSVP proxy
Create/Modify PDP Context Response
Create/Modify Sec PDP Context Resp
End of RSVP establishment: RSVP RESV generated by MT and transported to initiating side.
MT provides instance of RSVP proxy
Data phase
PATH
RESV
MT locally acts on PATH, generates RESV
Gateway locally generates PATH, acts on RESV
PATH
RESV

Fig. 28

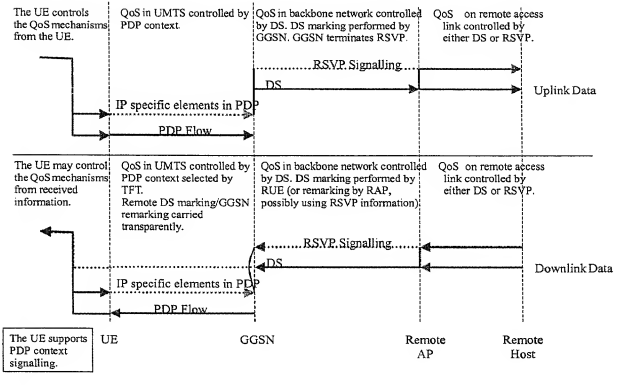
The UE controls the QoS mechanisms from the UE.
QoS in UMTS controlled by PDP context.
QoS in backbone network controlled by DS. DS marking performed by GGSN. GGSN terminates RSVP.
QoS on remote access link controlled by either DS or RSVP.
RSVP Signalling
DS
Uplink Data
IP specific elements in PDP
PDP Flow
The UE may control the QoS mechanisms from received information.
QoS in UMTS controlled by PDP context selected by TFT. Remote DS marking/GGSN remarking carried transparently.
QoS in backbone network controlled by DS. DS marking performed by RUE (or remarking by RAP, possibly using RSVP information).
QoS on remote access link controlled by either DS or RSVP.
RSVP Signalling
DS
Downlink Data
IP specific elements in PDP
PDP Flow
The UE supports PDP context signalling.
UE
GGSN
Remote AP
Remote Host

Fig. 29

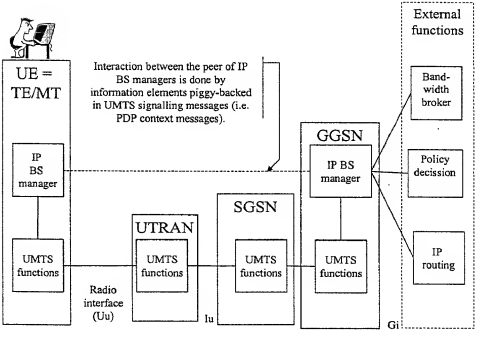
External functions
UE = TE/MT
Interaction between the peer of IP BS managers is done by information elements piggy-backed in UMTS signalling messages (i.e. PDP context messages).
Band-width broker
GGSN
IP BS manager
Policy decission
SGSN
UTRAN
IP BS manager
IP routing
UMTS functions
UMTS functions
UMTS functions
UMTS functions
Radio interface (Uu)
Iu
Gi

Fig. 30

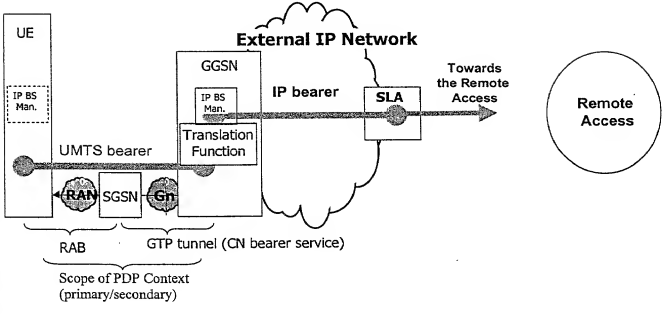
UE
IP BS Man.
External IP Network
GGSN
IP BS Man.
IP bearer
SLA
Towards the Remote Access
Remote Access
Translation Function
UMTS bearer
RAN
SGSN
Gn
RAB
GTP tunnel (CN bearer service)
Scope of PDP Context (primary/secondary)

Fig. 31

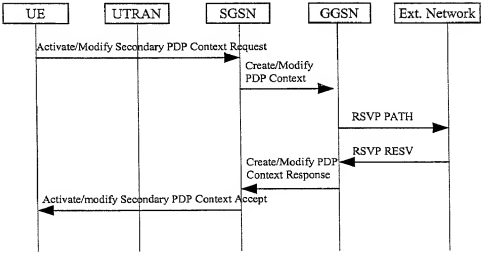
UE
UTRAN
SGSN
GGSN
Ext. Network
Activate/Modify Secondary PDP Context Request
Create/Modify PDP Context
RSVP PATH
RSVP RESV
Create/Modify PDP Context Response
Activate/modify Secondary PDP Context Accept

Fig. 32

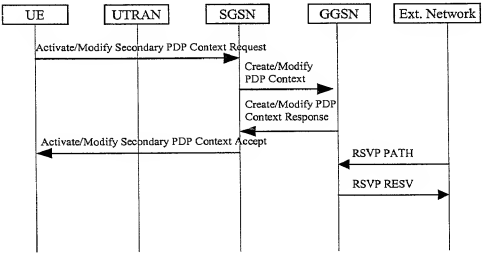
UE
UTRAN
SGSN
GGSN
Ext. Network
Activate/Modify Secondary PDP Context Request
Create/Modify PDP Context
Create/Modify PDP Context Response
Activate/Modify Secondary PDP Context Accept
RSVP PATH
RSVP RESV

Fig. 33

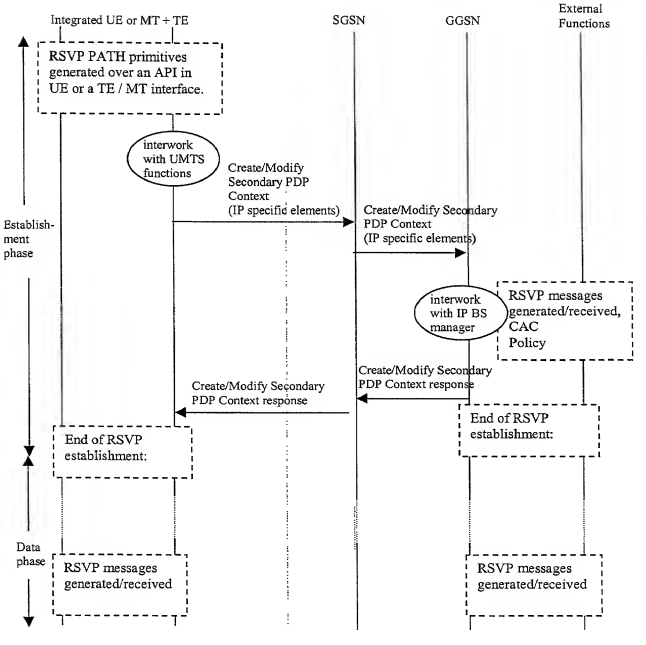
Integrated UE or MT + TE
SGSN
GGSN
External Functions
RSVP PATH primitives generated over an API in UE or a TE / MT interface.
interwork with UMTS functions
Create/Modify Secondary PDP Context (IP specific elements)
Create/Modify Secondary PDP Context (IP specific elements)
Establish-ment phase
interwork with IP BS manager
RSVP messages generated/received, CAC Policy
Create/Modify Secondary PDP Context response
Create/Modify Secondary PDP Context response
End of RSVP establishment:
End of RSVP establishment:
Data phase
RSVP messages generated/received
RSVP messages generated/received

Fig. 34

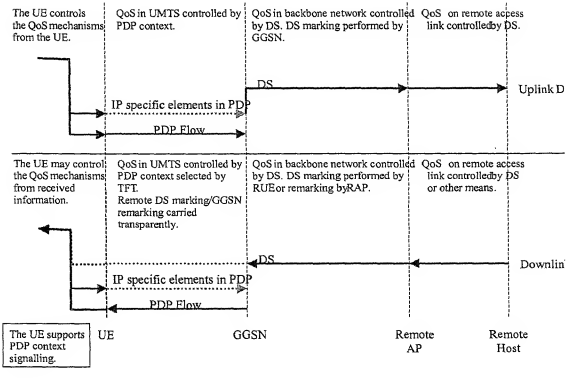
The UE controls the QoS mechanisms from the UE.
QoS in UMTS controlled by PDP context.
QoS in backbone network controlled by DS. DS marking performed by GGSN.
QoS on remote access link controlled by DS.
DS
Uplink D
IP specific elements in PDP
PDP Flow
The UE may control the QoS mechanisms from received information.
QoS in UMTS controlled by PDP context selected by TFT.
Remote DS marking/GGSN remarking carried transparently.
QoS in backbone network controlled by DS. DS marking performed by RUEor remarking byRAP.
QoS on remote access link controlled by DS or other means.
DS
Downlin
IP specific elements in PDP
PDP Flow
The UE supports PDP context signalling.
UE
GGSN
Remote AP
Remote Host

Fig. 35